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The long-term results of percutaneous drainage of diverticular abscess

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ABSTRACT

INTRODUCTION Diverticulitis is a common condition occasionally complicated by abscess formation. Small abscesses may be managed by antibiotic therapy alone but larger collections require drainage, ideally by the percutaneous route. This minimally invasive approach is appealing but there is little information regarding the long-term follow-up of patients managed in this way. To address this question, we looked at a consecutive series of patients who underwent percutaneous drainage in our institution.

PATIENTS AND METHODS A retrospective study was performed of patients undergoing percutaneous drainage of a diverticular abscess from 1999–2007.

RESULTS A total of 26 abscesses were identified in 16 patients. In 69% of cases, the abscess was located in the pelvis. The mean size of the abscesses was 8.5 ± 0.9 cm. Drainage was performed under CT (83%) or ultrasound guidance. The mean duration of drainage was 8 days. Fistula formation following drainage occurred in 38% of cases. Eight patients (mean age, 71 years) underwent subsequent surgical resection 9 days to 22 months (mean, 7 months) following initial presentation. Eight patients with significant co-morbid conditions were managed by percutaneous drainage only. The 1-year mortality was 20% and resulted from unrelated causes. The long-term stoma rate was 13%.

CONCLUSIONS Percutaneous drainage can safely be performed in patients with a diverticular abscess. It can be used as a bridge before definitive surgery but also as a treatment option in its own right in high-risk surgical patients. We believe percutaneous drainage reduces the need for major surgery and reduces the risk of a permanent stoma.

KEYWORDS

Percutaneous – Drainage – Diverticular abscess – Stoma

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An acute episode of diverticulitis may be complicated by the development of an abscess. In 1978, Hinchey *et al.*[1] attempted to classify complicated diverticular disease. The classification describes mesocolic (stage I) and pelvic abscess (stage II) with stages III and IV reserved for patients with generalised peritonitis. Whilst surgery is the management of choice for the latter two stages, the optimal management remains controversial for the early stages of complicated diverticular disease.

Computed tomography (CT) is the imaging modality of choice in patients presenting with diverticulitis.[2,5] Studies have shown that the incidence of an abscess complicating an episode of diverticulitis ranges from 17–19%.[4–6] The American Society of Colon and Rectal Surgeons recommended that small mesocolic abscesses can be treated with intravenous antibiotics.[7,8] In contrast, large abscesses may be drained percutaneously or by an open procedure. However, there is no appropriate consensus as to the ideal size or location of an abscess which is amenable to percutaneous drainage.

Percutaneous drainage of an abscess is now an accepted procedure for the drainage of intra-abdominal abscesses because it is both effective and minimally invasive.[9] Successful percutaneous drainage can be performed in 70–90% of patients with an amenable diverticular abscess. However, patient selection and the long-term effects of drainage and subsequent surgery are unclear. Our study was undertaken to determine the long-term results following percutaneous drainage of a diverticular abscess. We assessed whether percutaneous drainage was an effective procedure and, once drained, the percentage of patients subsequently requiring surgery.

Patients and Methods

Notes of patients who underwent percutaneous drainage of diverticular abscess between January 1999 and May 2007 in our institution were identified. Records were also cross-referenced with radiological reports to confirm patients had undergone percutaneous drainage. Notes were scrutinised for patient demographics, imaging modality, time to drainage and subsequent management. Culture results of the drain fluid were recorded as well as histology of resected specimens from patients undergoing resection. The long-term patient follow-up was conducted by contacting the family physician by telephone call and scrutinising notes for all subsequent hospital admissions. Results are shown as mean ± SEM.

Table 1 Co-morbidities of patients undergoing percutaneous drainage of a diverticular abscess

Co-morbidities	Percentage
Hypertension	25
Congestive cardiac failure	13
Ischaemic heart disease	13
Chronic obstructive pulmonary disease	19
Diabetes	13
Steroids	6
Malignancy	13

Results

Sixteen patients were identified who had undergone percutaneous drainage of a diverticular abscess. Patients identified were all elderly (mean age, 73 years) and predominantly female (M:F = 4:12). There was a significant range of co-morbid conditions (Table 1). The mean weight at presentation was 72 kg. Initial presentation was associated with a mild pyrexia (mean, 37.3°C) and raised systemic white cell count (mean, 15.9 ± 1.4 x 10^9 cells/l) and C-reactive protein (mean, 220 ± 22.1 mg/dl). Five of 16 patients (31%) had a previous documented episode of diverticulitis.

Table 2 Operative management following percutaneous drainage

Operation	Age at present.* (yrs)	Indication	Length of time between IP & surg (months)	Previous episode of diverticulitis	Site of abscess	ASA grade	Reversal of stoma	Follow-up from initial surgery (months)	Current status
Anterior resection and defunctioning loop ileostomy	64	Colovaginal fistula	22	Yes	Pelvic	3	Yes	77	Alive
Anterior resection	63	Recurrent abscess and symptomatic	21	No	Mesocolic	1	–	44	Alive
Sigmoid colectomy	79	Colovesical fistula	3	No	Mesocolic	2	–	81	Alive
Hartmann's procedure	77	Failure of resolution	0.8	No	Pelvic	2	Yes	54	Alive
Right hemicolectomy	41	Failure of resolution	0.3	No	Pelvic	2	–	94	Alive
Anterior resection	78	Enterocutaneous fistula (underlying carcinoma)	8	Yes	Pelvic	2	–	5	Alive
Hartmann's procedure	89	Enterocutaneous fistula (underlying carcinoma)	2	Yes	Mesocolic	3	No	22	Deceased
Anterior resection	79	Colovesical fistula	0.3	Yes	Mesocolic	3	–	28	Deceased

ASA, American Society of Anesthesiologists.

Present.* = Presentation; IP = Initial presentation; surg. = surgery

Table 3 Non-operative management following percutaneous drainage

Age at presentation	Co-morbidity	Follow-up (months)	Site of abscess	Previous diverticulitis	Current status
51	Obese (111 kg)	19	Pelvic	No	Alive – declined surgery
80	AF	92	Pelvic	No	Alive
70	AF/IHD	98	Mesocolic	Yes	Alive
77	COPD/IHD	44	Pelvic	No	Deceased
68	COPD/DM/CCF	16	Pelvic	No	Deceased
96	CCF	1	Pelvic	No	Deceased
76	COPD and ovarian carcinoma	2	Pelvic	No	Deceased
78	Cholangiocarcinoma	7	Pelvic	No	Deceased – developed colovesical fistula

AF, atrial fibrillation; IHD, ischaemic heart disease; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; CCF, congestive cardiac failure.

The majority of patients underwent CT (75%) as the initial radiological investigation; in four patients, the initial investigation was ultrasonography. The mean time to the initial scan was 2 days and a further 3 days to subsequent percutaneous drainage. A total of 26 abscesses were identified in 16 patients. The mean size of the abscesses was 8.5 cm. In the majority of cases, the abscess was situated in the pelvis (69%) with the remainder being mesocolic in location. Overall, 18 percutaneous drains were inserted in 16 patients. CT was the preferred technique to guide percutaneous drainage in 83% of cases. In instances where more than one abscess was identified, the drain was inserted in the largest abscess.

All drains were inserted using a Seldinger technique performed under local anaesthesia by an experienced radiologist. The drains were all of a self-locking, pig-tail design and were connected to a closed bag with facility for saline irrigation through a 3-way tap. Drain sizes ranged from 8–14 French (mode 12 French). The mean duration of drainage was 8 days; the two commonest cultured bacteria were *Escherichia coli* and anaerobes. The commonest antibiotic regimen prescribed was a cephalosporin and metronidazole. There were no acute complications following percutaneous drainage. All patients tolerated the procedure well with no drain dislodgement. The mean volume of drainage fluid was 164 ml. Follow-up CT was performed at a mean time of 10 days following initial drainage to determine if the abscess had resolved. If there was no evidence of re-accumulation, the drain was removed. In two patients (13%), there was a persistent abscess and they underwent (two) further percutaneous drainage procedures. Both these patients were in the non-operative group.

Fistula formation occurred in 6 (38%) cases. However, only 2 (13%) were enterocutaneous with the remainder being colovisceral (3 colovesical and 1 colovaginal). Surgical resection was performed in 8 (50%) patients. Mortality from all-causes in this patient group was 20% at 1 year following drainage. A review of the case notes indicated that the cause of death was unrelated to percutaneous drainage.

In the eight patients who underwent subsequent surgical resection, the commonest indication was development of a fistula in 5 (63%) patients (Table 2). Two patients were still symptomatic despite drainage and one developed a further diverticular abscess (< 2 cm) 13 months from the initial presentation. The latter was unsuitable for percutaneous drainage. The mean age in the operative group was 71 years and in 4 of 8 cases had there been a previous documented episode of diverticulitis. The mean time to operation was 7 months and the long-term stoma rate was 14%. Histology in all patients confirmed diverticular disease but it also showed a sigmoid carcinoma in two patients. In both the latter cases, patients developed an enterocutaneous fistula. To date, at a mean time of 60 months following surgery, none of the patients has been admitted with a further attack of diverticulitis. The cause of the two deaths in this group occurred at 28 and 22 months after surgery. In the former, it resulted from a pulmonary embolus following a femoral neck fracture and was unrelated to complications of a diverticular abscess. In the latter, death was secondary to recurrent colon carcinoma.

Eight patients did not require operative intervention following percutaneous drainage. The mean age of patients was 75 years and their co-morbidities are shown in Table 3.

Two patients in this group underwent repeated drainage for a residual abscess. The majority of abscesses (88%) were located in the pelvis and the overall mortality in this group was 63% (5 of 8). The cause of death was either secondary to the underlying malignancy or associated co-morbidity. The remaining three patients have not undergone surgery either due to personal choice or were deemed high anaesthetic risk. Only one patient (13%) in this non-operative group developed a fistula; however, mean follow-up was shorter than in the operative group (35 months versus 60 months).

Discussion

The results show that percutaneous drainage of a diverticular abscess can be performed safely in patients with significant co-morbidity. In this study, we describe two treatment strategies. First, the operative group in which drainage served as an adjunct to surgery; second, the non-operative group with significant patient co-morbidity, for whom long-term benefit was achieved by percutaneous drainage alone.

This patient group with complicated diverticular disease was elderly and predominantly female as described by Salem *et al.*[10] A previous episode of diverticulitis did not correlate with the subsequent development of a diverticular abscess. This is in keeping with reports that a previous attack of diverticulitis is a poor predictor of subsequent complications.[11,12] Not surprisingly, elevated white cell count and C-reactive protein were associated with a diverticular abscess but are unlikely to be specific. An association with obesity and complicated diverticular disease was not seen in this study.[13]

In our study, over a 7-year period, we found only a small number of abscesses that were deemed suitable for percutaneous drainage. Siewert *et al.*[5] over a 12-month period, using CT, diagnosed an abscess in 17% of patients presenting with diverticulitis. However, percutaneous drainage was performed in only 13% of these patients. In other words, only 2% of diverticular abscesses were suitable for drainage. Furthermore, they correlated treatment according to size and found that an abscess less than 3 cm could be treated effectively with antibiotic alone, with a subsequent surgical resection rate of 36%. In contrast, patients having an abscess greater than 4 cm managed by drainage had a 63% chance of undergoing surgery. Our own study, with a mean abscess size of 8.5 cm, would support the finding that an abscess must be sufficiently large to be amenable to percutaneous drainage. In general, most studies describe a diverticular abscess amenable to percutaneous drainage as in the range 4–15 cm in diameter.[14,15] Clinical practice guidelines for diverticulitis from the American Society of Colon and Rectal Surgeons suggest that an abscess < 2 cm can resolve with intravenous antibiotic treatment.[8] The literature suggests that whilst diverticular abscesses may be common, only a small percentage are deemed suitable for percutaneous drainage.

In our study, we did not identify any association with abscess location and subsequent surgical resection. However, Ambrosetti *et al.*[6,16] observed that both intra-abdominal and pelvic abscesses were associated with a significant risk of surgery compared with a mesocolic abscess. The latter had a lower risk of requiring surgery once adequately drained. However Kaiser *et al.*[4] found that a diverticular abscess, irrespective of location, was a marker of failure of medical management and required subsequent surgery.

An interesting finding was the incidence of fistula formation following drainage which approached 38%. Fistula rate in patients undergoing percutaneous drainage has been reported to range from 29–63%.[14,15] In these series, a sinogram was routinely performed following drainage to delineate any fistula. Our results did not show any association with abscess location and development of fistula. It is possible that a colovisceral fistula is the result of the natural progression of complicated diverticular disease or secondary to inadequate drainage. If the assumption is made that drainage directly predisposes to fistula formation, then only 13% of fistulas were enterocutaneous. Furthermore, these occurred in patients who had an underlying carcinoma. It would, therefore, seem that drainage does not lead to an increase in cutaneous fistula formation unless there is an underlying cause such as a colonic carcinoma.

In the group in which delayed surgical resection was undertaken, the notable factor was the relatively low permanent stoma rate (13%). Similar findings have been reported by Kaiser *et al.*,[4] who had a zero stoma rate following drainage and delayed surgery compared with a 40% stoma rate in emergency surgery. Stabile *et al.*[17] found that, in 74% of cases following drainage, they were able to perform a single-stage surgical procedure. The low stoma rate translates into an overall cost saving.[18]

Drainage only was an acceptable procedure in patients with underlying non-operable, extra-colonic malignancy or significant co-morbidity. The commonest co-morbidity encountered in this group was chronic obstructive pulmonary disease. The cause of death in these patients was attributable to the underlying disease and not to sepsis secondary to complicated diverticular disease. In those for whom surgery was not performed, due to a high anaesthetic risk, percutaneous drainage does offer effective treatment because none had a subsequent attack of diverticulitis.

In two patients following surgical resection, a sigmoid carcinoma was found. This highlights an important point in that, following an attack of suspected diverticulitis, investigations should be performed which visualise the colon to

exclude an underlying malignancy especially in those in whom surgery is not planned.

Conclusions

Experience from our institution would advocate that large diverticular abscesses, identified by CT or ultrasound, should be drained percutaneously. This minimally invasive strategy treats the immediate source of sepsis and allows for elective primary resection. In high-risk patients, percutaneous drainage is a satisfactory treatment modality in its own right avoiding complications of major surgery. This approach is associated with a low permanent stoma rate.

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